Financial Vulnerability and Export Dynamics

Mélise Jaud, Youssouf Kiendrebeogo, Marie-Ange Véganzonès-Varoudakis

CENTRE D'ETUDES
ET DE RECHERCHES
SUR LE DEVELOPPEMENT
INTERNATIONAL

SÉRIE ÉTUDES ET DOCUMENTS

Financial Vulnerability and Export Dynamics

Mélise Jaud
Youssouf Kiendrebeogo
Marie-Ange Veganzones-Varoudakis

Études et Documents n° 26

October 2015

To cite this document:
Jaud M., Kiendrebeogo Y., Veganzones-Varoudakis M.-A. (2015) "Financial Vulnerability and Export Dynamics", *Études et Documents,* n° 26, CERDI.
http://cerdi.org/production/show/id/1754/type_production_id/1

CERDI
65 BD. F. MITTERRAND
63000 CLERMONT FERRAND – FRANCE
TEL. + 33 4 73 17 74 00
FAX + 33 4 73 17 74 28
www.cerdi.org

The authors

Mélise Jaud
The World Bank, Office of the Chief Economist for MNA
Email : mjaud@worldbank.org

Youssouf Kiendrebeogo
The World Bank, Office of the Chief Economist for MNA
Email : ykiendrebeogo@worldbank.org

Marie-Ange Veganzones-Varoudakis
Clermont Université, Université d'Auvergne, CNRS, UMR 6587, CERDI, F-63009 Clermont Fd
veganzones@aol.com

Corresponding author: Youssouf Kiendrebeogo

This work was supported by the LABEX IDGM+ (ANR-10-LABX-14-01) within the program "Investissements d'Avenir" operated by the French National Research Agency (ANR).

Études et Documents are available online at: http://www.cerdi.org/ed

Director of Publication: Vianney Dequiedt
Editor: Catherine Araujo Bonjean
Publisher: Mariannick Cornec
ISSN: 2114 - 7957

Abstract

This study documents the implications of financial vulnerability for export diversification in developing economies. Financial crises, by increasing the incidence of sunk costs of entry into exporting, reduce firm export dynamics. Financially-vulnerable exporters are not able to fully realize economies of scale in production and access better-sophisticated technologies. The number of products and destinations per exporter are therefore likely to decrease in times of crisis. We use a comprehensive cross-country dataset on export dynamics, with data covering the 1997-2011 period for 34 developing countries to investigate this issue. Building on the generalized difference-in-differences procedure proposed by Rajan & Zingales (1998) to remove any endogeneity bias, the results point to a negative and economically large effect of financial vulnerability on export diversification.

Financial crises reduce export dynamics disproportionately more in financially dependent industries. This effect is less pronounced in countries with initially more open capital account, suggesting that portfolio inflows are good substitutes for underdeveloped domestic financial markets.

Key words

Financial crises, Financial vulnerability, Export dynamics

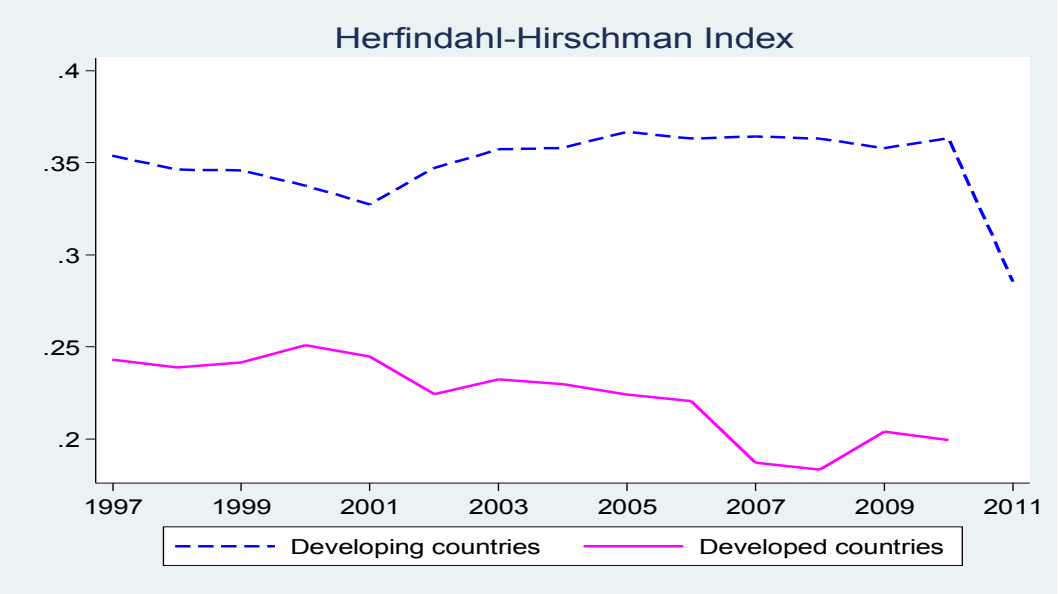
JEL codes

F12, F14, G01, O16

1. Introduction

Diversification maters for economic development. To reduce vulnerability to external shocks, a country needs to build its capacity to reorient and redirect some of its exports towards new products and markets. The gains from trade diversification go beyond the benefits of specialization due to comparative advantage. By reducing price instability and output volatility, export diversification plays a central role in driving long-run growth and macroeconomic stability. Yet, developing countries have long been dependent on a narrow set of export products, despite some recent progress toward diversifying products and partners. Figure 1 shows that over the period 1997-2011, export concentration has been on average more than two times higher in developing countries than in advanced countries, although the gap has decreased in recent years. [1]

FIGURE 1 – Evolution of export concentration : 1997-2011



Interestingly, however, this relatively low export diversification in developing countries suggests the existence of more room for upgrading the existing export basket. Also, export concentration is likely to be heterogeneous across both developing countries and geographical regions. Country-specific characteristics, circumstances, institutions and policies might have played a role in the process of structural transformation. In light of the implications of "sunk costs" for export participation discussed in the literature, one of the main drivers of this process is the vulnerability of firms to adverse financial shocks. Due to

1. Export diversification is measured here by the Herfindahl-Hirschman index. Notice that higher values of this index indicate lower diversification.

the existence of substantial sunk costs of entry into exporting (see, for instance, Roberts & Tybout, 1997; Bernard & Wagner, 2001; Melitz, 2003), only more productive firms or firms with a certain level of financial health are able to export. Furthermore, financial vulnerability has been identified as one of the major trade barriers (Manova, 2008; Berman & Héricourt, 2010; Minetti & Zhu, 2011; Chor & Manova, 2012) and the evidence suggests that the effect of credit rationing on exports is likely to be more pronounced in developing countries. The World Bank Enterprise Surveys country reports show that the percentage of firms identifying access to finance as a major constraint is typically higher in developing countries. [2]

At the macro level, compelling evidence supports the connection between financial development and export performance (Beck, 2002, 2003; Svaleryd & Vlachos, 2005; Manova, 2006, 2008; Becker & Greenberg, 2007). The idea is that countries with less developed financial sectors are likely to export goods not requiring external funding. Also, the empirical literature described how banking crises reduce export volumes but the underlying issue of the effect of crises on export diversification remains unresolved. In particular, it is still unclear whether the crisis effect of trade is the result of a reduced number of products, a reduced number of destination, or both. In addition, while there is a large literature on the implications of financial vulnerability for export-market participation, country samples have varied substantially across studies and very few papers have focused exclusively on developing countries.

This paper is, to the best of our knowledge, the first contribution to understand the extent to which financial vulnerability affects export dynamics. We focus on the developing world for three main reasons : (i) it experiences relatively highly-concentrated exports, (ii) it displays substantial heterogeneity across countries in export diversification, (iii) it is more likely to experience financial vulnerability than the advanced world. In part due to the lack of cross-country data on export diversification for developing countries, few studies have quantified the impact of financial vulnerability on export dynamics in these countries. This study also makes an important contribution to the literature by using a comprehensive cross-country database on exporter dynamics compiled at the industry level. The identification strategy follows the procedure introduced by Rajan & Zingales (1998) (henceforth RZ), which is well-known to be convenient in correcting for a potential endogeneity bias. The paper is concerned with the following specific questions : How do

2. These country reports are available at http://www.enterprisesurveys.org/Reports.

financial crises affect firm, product and destination dynamics ? Do firms in industries with higher financial dependence suffer more ? Does this effect vary across countries with different levels of capital account openness ?

The main result suggests that financial crises disproportionately increase export concentration in financially-vulnerable industries. Financial crises tend to reduce firm, product and destination entry rates, while increasing the corresponding exit rates. These effects are relatively more important in industries with higher financial dependence. Countries are also affected differently, with regard to the capital account openness. In the remainder of the paper, we present the identification strategy and the data used in Section 2. The results are discussed in Section 3, while Section 4 provides conclusions and implications for policymaking.

2. Empirical Strategy and Data

2.1. Baseline Estimating Equation

The central idea behind this study is that financial crises disproportionately hurt export concentration in industries that are more dependent on external financing. This is tested by estimating the following econometric specification :

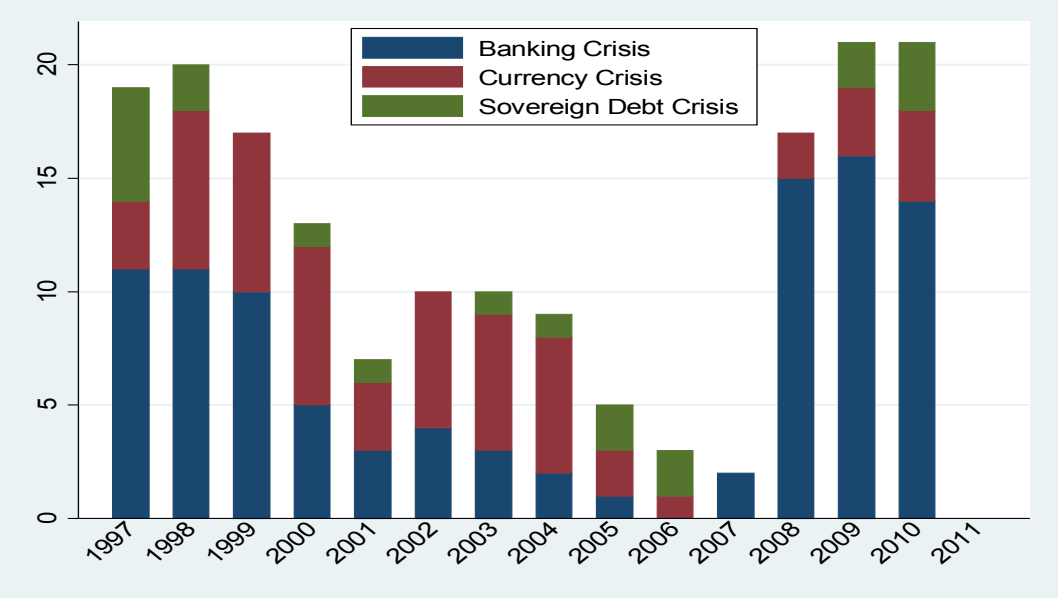
$$Export_{cpkt} = FinVul_k \sum_{j=0}^{J} (\beta_1 Crisis_{c(t-j)} + \beta_2 Crisis_{p(t-j)} + \beta_3 Crisis_{cp(t-j)}) + \alpha X_{cpt} + d_{ct} + d_{pt} + d_{ck} + \epsilon_{cpkt} \quad (1)$$

where $Export_{cpkt}$ is the indicator of export diversification in country c for trading partner p, in the industry k during the year t. $FinVul_k$ is the index of financial vulnerability that captures the degree of external financial dependence in industry k. This is the RZ index of external financial dependence. [3] $Crisis_{c(t-j)}$ is a dummy indicating whether a financial crisis happened in country i year $t-j$. We include both the contemporaneous and lag crisis dummies to capture the average effect of a crisis on export diversification during its onset and in the following years. Three dimensions of financial crises are considered, namely banking, currency, and sovereign debt crises. Figure 2 provides the number of countries experiencing a financial crisis over time for our period of interest.

3. We also used the Braun (2003) index of asset tangibility and the results are consistent with those that are presented.

X_{cpt} is a set of conditioning information to control for other country-level factors influencing export diversification. This includes the Log of real GDP per capita and the Log of real exchange rate. The other potentially omitted macro factors will be captured through country-year and partner-year fixed effects (d_{ct} and d_{pt}). We also include country-partner fixed effects to account for other gravity controls such as distance and common language. d_{ck} are country-industry fixed effects to control for industry-level unobserved heterogeneity across countries.

FIGURE 2 – Number of countries experiencing a financial crisis (starting date)



Source : Laeven & Valencia (2013)

2.2. Identification

In estimating the baseline specification (Equation 1), the immediate concern is the endogeneity bias arising from reverse causality, omitted variables or measurement errors on the regressor variables. Although the omitted variable bias is importantly limited by the introduction of our set of fixed effects, reverse causality from exports to financial vulnerability remains a central concern. [4]

This issue is addressed by building on the generalized procedure proposed by Rajan & Zingales (1998). This approach has been largely used to estimate sectoral differential

4. This is consistent with the argument of Do & Levchenko (2007), that is changes in trade patterns result in changes in changes in demand for external financing, thus influencing developments in the financial sector.

effects (see, for instance, Dell' Ariccia *et al.*, 2008; Manova, 2008; Chor & Manova, 2012). In practice, this method consists in using the financial dependence of U.S. firms on external financing as a proxy for the demand for external finance in developing countries. The main rationale is that any need for external finance in a steady-state equilibrium is the result of worldwide technical shocks. This amounts to saying that the demand for external financing of U.S. firms is therefore a good proxy for firms' financial dependence in developing countries.

2.3. Data, Country sample, and sample period

The set of countries covered in this study is motivated by the consideration of focusing on countries with highly concentrated exports and less financially developed countries, which are mostly developing economies. The sample consists of 34 developing countries, including 2 countries from the East Asia & the Pacific (EAP) region, 3 countries from the Europe & Central Asia region (ECA) region, 5 countries from the Middle East & North Africa (MENA) region, 2 countries from the South Asia (SA) region, and 12 countries from the Sub-Saharan Africa (SSA) region. [5]

Export diversification data, compiled at the HS 6-digit level of disaggregation, come from the Exporter Dynamics Database (Cebeci *et al.*, 2012). [6] Export diversification is measured by three dimensions of export dynamics : (*i*) firm dynamics, (*ii*) product dynamics, and (*iii*) destination dynamics. For each dimension, we use both the entry/exit rates into/from export markets. Notice that when using destination entry and exit rates, one only have a country-industry-year dimension, since the destination dimension disappears.

To match these data with the financial vulnerability indicator, we aggregate them to the 3-digit ISIC industry level, using the Haveman's concordance tables. [7] The measure of financial vulnerability, available at the 3-digit ISIC industry level, is taken from Rajan & Zingales (1998). The other regressor variables such as the real GDP per capita and the real exchange rate come from the World Bank *World Development Indicators (WDI)*. The regressions are ran on annual data, for the period 1997-2011.

5. The list of countries is provided in the appendix.

6. The Exporter Dynamic Database is available at http://data.worldbank.org/data-catalog/exporter-dynamics-database.

7. Haveman's industry concordance tables are available at http://www.macalester.edu/research/economics/page/haveman/Trade.Resources/tradeconcordances.html.

2.4. Financial vulnerability and export diversification : facts

The data suggest that export dynamics remain relatively weak in developing countries, though there is significant heterogeneity across countries. In these countries, the firm entry rate is 53%, as compared with 62% in developed countries (Table 1). At the same time, the firm exit rate is in developing countries (59%) is more than two times higher than that in advanced economies (21%). Similarly, the product entry rate is relatively higher in developed countries (31% vs. 27%) but they experience a relatively lower product exit rate (18% vs. 23%), as compared to the corresponding rates in the developing world. The same picture is observed with regard to destination dynamics, where the entry/exit rates are again relatively higher/lower in developed countries (44% vs. 25% and 23% vs. 38%) than in developing countries.

Table 1 – Summary statistics : Export diversification

Variable	Obs.	Mean	p50	Std. Dev.	Minimum	Maximum
	Developed countries					
Firm entry rate	12587	0.62	0.50	0.27	0	1
Firm exit rate	12606	0.21	0.24	15.13	0	1
Product entry rate	11161	0.31	0.31	0.16	0	1
Product exit rate	6816	0.18	0.18	0.15	0	1
Destination entry rate	6345	0.44	0.46	0.10	0	1
Destination exit rate	4257	0.23	0.23	0.10	0	1
	Developing countries					
Firm entry rate	28235	0.53	0.58	0.19	0	1
Firm exit rate	27768	0.59	0.54	0.28	0	1
Product entry rate	21538	0.27	0.25	0.23	0	1
Product exit rate	21451	0.23	0.22	0.31	0	1
Destination entry rate	17329	0.25	0.23	0.18	0	1
Destination exit rate	17171	0.38	0.37	0.29	0	1

Note : These summary statistics are based on sector-level data in the 3-digit ISIC industry classification.

Table 2 – Export diversification and financial dependence

Variable	Obs.	Mean	Std. Dev.	p50	Minimum	Maximum
	Top 50% of the distribution of financial dependence					
Firm entry rate	12616	0.72	0.72	0.68	0	1
Firm exit rate	12402	0.48	0.48	0.84	0	1
Product entry rate	9410	0.29	0.28	0.23	0	1
Product exit rate	9410	0.24	0.22	0.23	0	1
Destination entry rate	8639	0.27	0.25	0.17	0	1
Destination exit rate	8532	0.23	0.20	0.18	0	1
	Bottom 50% of the distribution of financial dependence					
Firm entry rate	15619	0.32	0.31	0.54	0	1
Firm exit rate	15366	0.70	0.72	0.91	0	1
Product entry rate	12128	0.24	0.23	0.23	0	1
Product exit rate	12041	0.29	0.28	0.22	0	1
Destination entry rate	8690	0.23	0.21	0.18	0	1
Destination exit rate	8639	0.26	0.25	0.17	0	1

Note : These summary statistics are based on sector-level data in the 3-digit ISIC industry classification.

More interestingly, the standard deviation of firm, product, and destination entry

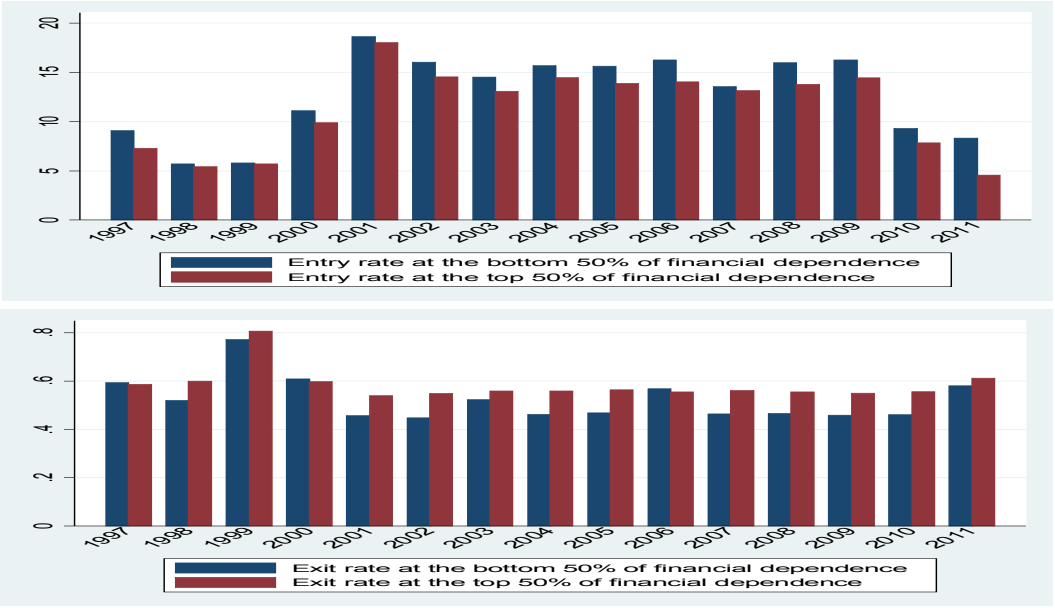
and exit rates is always higher in the developing sample, suggesting a relatively higher heterogeneity. This could be due to the fact that developing countries are more represented in the sample (87% of the country sample is developing) but does not eliminate the reasons why focusing on the developing sample is interesting.

Furthermore, regarding the financial vulnerability issue, financial dependence tend to be a more important determinant of export dynamics in developing country than in advanced countries mainly due to market failures. These main reasons led us to put our focus on the developing sample in the remaining empirical excises.

The correlation between external financial dependence and export dynamics can be described using the RZ index. On the one hand, industries at the top 50% of the distribution of financial dependence (industries more dependent on external finance) experience lower firm, product, and destination entry rates than industries at the bottom 50% of this distribution (Table 2). On the other hand, exit rates in financially dependent industries appear to be relatively more important than in other industries.

Alternatively, when we use the Braun (2003) index of asset tangibility, the data consistently show that the firm, product and destination entry rates are always relatively higher in industries with higher collateralizable assets. At the same time, industries with higher collateralizable assets observe relatively lower exit rates than industries with fewer collateralizable assets. [8]

FIGURE 3 – Financial dependence and export diversification over time



8. To save space, these statistics are not presented here but are available upon request.

The statistical link between the external financial dependence and export dynamics in developing countries is also evidenced for each year of our sample period (Figure 3). The average firm, product, and destination entry rates in industries at the bottom 50% of the distribution of financial dependence is always higher than that of industries at the top 50% of this distribution. As for the average firm, product, and destination exit rate, it appears however to be relatively higher in industries with higher financial dependence, with the exceptions of years 2000 and 2006.

These facts suggest a possible association between financial vulnerability and export dynamics in developing countries. In the remaining part of the paper, we further investigate the impact of financial crises on exporter dynamics.

3. Main findings

Previous studies on the impact of financial crises on international trade have paid little attention to the extent to which crises affect exporter dynamics. In this section we investigate the effects of financial crises on the three following dimensions of export dynamics : (*i*) firm dynamics, (*ii*) product dynamics, and (*iii*) destination dynamics.

3.1. Financial crises and firm dynamics

Table 3 presents the estimates of the baseline specification, Equation 1, using firm entry and exit rates as dependent variables. [9] The main variables of interest are the dummies of crisis in exporter and importer, their lags, and their corresponding interaction terms. Without controlling for the crisis interaction, the coefficient estimates on the contemporaneous and lagged crisis dummies in both exporter and importer have the anticipated signs and are statistically significant. The contemporaneous effect suggests that financial crises are associated with relatively higher declines in the firm entry rate in financially-dependent industries (columns 1 and 3). The magnitude of these coefficients is economically meaningful, indicating that the firm entry effects of crises in exporter and importer are -7.1 and -2.5 percentage points more pronounced for industries with higher financial dependence (column 1).

These results point to a relative importance of the supply-side shock, compared to

9. The variation of firm dynamics explained by the model is more than 80 percent, suggesting a good fit.

the demand-side shock. The results also confirm the presence of substantial sunk costs in export entry in times of financial crisis. [10]

Regarding the firm exit rate, the results on the contemporaneous crisis dummies show that experiencing a financial crisis in the partner country is associated with 10.6 percentage points relatively higher increase, for financially-dependent industries, in the rate at which firms exit the export market (column 3). The coefficient on the exporter crisis dummy is small and statistically indistinguishable from zero, reflecting a relative importance of demand shocks for the decision of firms to exit foreign markets. On the other hand, the average impact of supply-side shocks on the exit rate is relatively more important than that on the entry rate.

When controlling for the interacting effect of crises, these effects remain significant with very similar magnitudes. The negative and significant coefficient on the crisis interaction in column 2 indicates that the supply-side shocks and demand-side shocks complement and reinforce each other in decreasing the firm entry rate when both countries are in crisis. But the exacerbating effect is statistically insignificant on the firm exit rate (column 4). These effects of crises on firm entry/exit into/from exporting are sizable given the cross-country variation of firm dynamics in the data (see Table 1).

Turning to the lagged crisis dummies, their estimated effects have the expected signs as well. The results in column 1 show that the medium-run impact of crises on the firm entry is economically significant and disproportionately severe for financially-vulnerable industries. On average, the firm entry rate falls relatively higher in these industries by 7.8 and 11.3 percent in the 3 subsequent years after a financial crisis in the exporter and in the importer, respectively. Conversely, the firm exit rate raises relatively strongly in vulnerable industries by 9.3 and 6.8 percent in the medium-term, respectively for crisis in exporter and importer (column 3). The lagged crisis interaction also enters with the expected sign but its coefficient is only significant for the one-period lag. This is the sign that the exacerbating effect of crises on firm dynamics is not persistent over time.

The results on the control variables are quite intuitive as well. Real GDP per capita for both exporting and importing countries enter positively and significantly in explaining the

10. The sunk costs of entry into foreign markets include learning about foreign markets, administrative standards, and establishing distribution networks (e.g., Roberts & Tybout, 1997; Bernard & Wagner, 2001). These sunk costs are likely to be sensitive to firm financial conditions and are amplified during crises.

firm entry rate. Their impact on the firm exit rate displays the right sign but is insignificant at any conventional level. An increase in the real exchange rate, which represents a real appreciation of the exporter currency vis-à-vis the importer, reduces the entry rate of exporting firms but fails to show any significant effect on their exit rate.

TABLE 3 – Crises and firm dynamics

	(1)	(2)	(3)	(4)
Dependent variable	Firm entry rate of incumbents		Firm exit rate of incumbents	
Crisis in exporter	-0.071***	-0.075***	0.010	0.017
	(0.025)	(0.024)	(0.012)	(0.023)
Crisis in importer	-0.025***	-0.041***	0.106***	0.053***
	(0.007)	(0.013)	(0.046)	(0.016)
Crisis interaction		-0.283**		0.452
		(0.128)		(0.483)
Crisis in exporter (t-1)	-0.118***	-0.073**	0.039*	0.022*
	(0.040)	(0.032)	(0.022)	(0.012)
Crisis in importer (t-1)	-0.024***	0.013***	0.093***	0.057***
	(0.008)	(0.004)	(0.027)	(0.019)
Crisis interaction (t-1)		-0.092**		0.151***
		(0.004)		(0.048)
Crisis in exporter (t-2)	-0.183***	-0.101***	0.085**	0.057**
	(0.060)	(0.029)	(0.036)	(0.022)
Crisis in importer (t-2)	-0.009**	-0.010*	0.040***	0.066***
	(0.004)	(0.005)	(0.013)	(0.022)
Crisis interaction (t-2)		-0.016		0.191
		(0.050)		(0.216)
Crisis in exporter (t-3)	-0.129***	-0.107***	0.082**	0.073**
	(0.044)	(0.033)	(0.035)	(0.031)
Crisis in importer (t-3)	-0.002*	-0.001	0.051***	0.013*
	(0.001)	(0.003)	(0.015)	(0.007)
Crisis interaction (t-3)		-0.000		0.019
		(0.004)		(0.030)
Log exporter's real GDP PC	0.260***	0.318***	-0.154	-0.102
	(0.089)	(0.108)	(0.167)	(0.150)
Log importer's real GDP PC	0.319***	0.310***	-0.189	-0.172
	(0.106)	(0.100)	(0.195)	(0.199)
Log real exchange rate	-0.015*	-0.015*	0.003	0.007
	(0.008)	(0.009)	(0.010)	(0.013)
Average supply shock	-0.078**	-0.102*	0.093***	0.016
	(0.033)	(0.059)	(0.027)	(0.033)
Average demand shock	-0.113**	-0.044	0.068***	0.028
	(0.049)	(0.107)	(0.021)	(0.035)
Observations	27981	27981	27225	27225
R-squared	0.808	0.871	0.819	0.869

Note : The dependent variable is the rate of export entry or exit of firms by country-destination. The regressions include year and exporter-importer fixed effects. Heteroskedasticity-robust standard errors are reported in parentheses. ***, **, and * denote significance at the 1-percent, 5-percent, and 10-percent levels, respectively. All the crisis-related dummies are interacted with the sector-level financial dependence index.

3.2. Financial crises and product dynamics

This section complements the previous one by focusing on the second dimension of export dynamics : the product entry/exit rates into/from export markets. Product dynamics is one of the aspects of the intensive margin of exports. Indeed, firms entry and exit

do not tell us enough about the number new products exported. However, financial crises may affect product dynamics through the disruption effect and the income effect.

The results from estimating Equation 1 using product entry and exit rates as dependent variables are presented in Table 4. As before, we first focus on the impact of crises on export dynamics while ignoring the crisis interaction (columns 1 and 3). As anticipated, financially-vulnerable industries in crisis-hit countries tend to experience lower levels of bilaterally exported and imported products, reflecting the balance-sheet problems–increased fixed costs of exporting a new product–in the wake of financial crises. The contemporaneous estimated effects of financial crises on the product entry rate are statistically and economically significant (column 1).

TABLE 4 – Crises and product dynamics

	(1)	(2)	(3)	(4)
Dependent variable	Product entry rate of incumbents		Product exit rate of incumbents	
Crisis in exporter	-0.020**	-0.020**	0.184	0.182
	(0.010)	(0.009)	(0.205)	(0.206)
Crisis in importer	-0.095***	-0.086*	0.133**	0.129**
	(0.032)	(0.028)	(0.060)	(0.057)
Crisis interaction		-0.101*		0.002**
		(0.059)		(0.000)
Crisis in exporter (t-1)	-0.145**	-0.146**	0.204	0.204
	(0.045)	(0.048)	(0.213)	(0.194)
Crisis in importer (t-1)	-0.171***	-0.170***	0.237***	0.228***
	(0.050)	(0.051)	(0.065)	(0.073)
Crisis interaction (t-1)		-0.128**		0.032*
		(0.058)		(0.018)
Crisis in exporter (t-2)	-0.088***	-0.083***	0.107	0.105
	(0.029)	(0.026)	(0.148)	(0.146)
Crisis in importer (t-2)	-0.115*	0.098*	0.125***	0.125***
	(0.066)	(0.056)	(0.043)	(0.039)
Crisis interaction (t-2)		-0.041		0.219
		(0.052)		(0.287)
Crisis in exporter (t-3)	-0.036**	-0.037**	0.060	0.068
	(0.017)	(0.017)	(0.075)	(0.078)
Crisis in importer (t-3)	-0.097*	-0.094*	0.103***	0.101***
	(0.056)	(0.056)	(0.035)	(0.033)
Crisis interaction (t-3)		-0.003		0.144
		(0.003)		(0.205)
Log exporter's GDP PC	0.448***	0.439***	-0.099***	-0.092***
	(0.131)	(0.133)	(0.033)	(0.030)
Log importer's GDP PC	0.281***	0.280***	-0.108**	-0.108**
	(0.080)	(0.087)	(0.049)	(0.048)
Log real exchange rate	-0.017	-0.023*	0.062	0.063
	(0.038)	(0.013)	(0.116)	(0.129)
Average supply shock	-0.072***	-0.102*	0.068	0.016
	(0.033)	(0.059)	(0.071)	(0.033)
Average demand shock	-0.119***	-0.044	0.093***	0.028
	(0.049)	(0.107)	(0.027)	(0.035)
Observations	21006	21006	20989	20989
R-squared	0.740	0.752	0.717	0.719

Note : The dependent variable is the rate of export entry or exit of products by country-destination. The regressions include year and exporter-importer fixed effects. Heteroskedasticity-robust standard errors are reported in parentheses. ***, **, and * denote significance at the 1-percent, 5-percent, and 10-percent levels, respectively. All the crisis-related dummies are interacted with the sector-level financial dependence index.

In times of crisis, firms tend to delay exporting new products or abandon exporting some existing products owing to the limited access to working capital and reduced foreign demand. Other things being equal, financial crises are associated with 2 and 9.5 percentage points more pronounced collapses of the product entry rate in financially-vulnerable industries, respectively for crises in exporter and importer. In addition, the coefficients in column 3 indicate that the product exit rate raises disproportionately higher by 13.3 percent in financially-dependent industries during financial crises in the exporting country. The coefficient on the contemporaneous effect of crises on the product exit rate is positive but statistically insignificant, suggesting that demand shocks matter more than supply shocks for product exits. This is consistent with the results presented in Table 3 and signals that the disruption of trade credit at the height of a crisis in the exporting country introduces important sunk costs of entry of new products without necessarily causing the exit of existing products.

Once again, the estimated coefficients on the lagged crisis dummies indicate the gradual nature of the product dynamics adjustment. Nearly 50 percent (0.036/0.072) and 80 percent (0.097/0.119) of the effect of a financial crisis would remain three years after the event, respectively when the crisis occurs in the exporting and importing country. Financial crises in both exporter and importer countries are associated with relatively higher declines of the product entry rate and increases of the product exit rate in vulnerable industries. On average, the number of new exported products as a percentage of all products exported falls relatively higher in vulnerable industries by 7.2 and 11.9 percent over three years following the onset of the crisis, respectively for a crisis in the exporter and importer countries.

By contrast, a financial crisis in the importing country leads to 9.3 percentage points relatively higher increase of the product exit rate over the three following years in financially-dependent industries. The crisis in the exporting country positively affects the product exit rate but its effect is statistically insignificant. As regards the estimated coefficients on the crisis interaction terms, it is apparent that the impact of financial crises on product dynamics is amplified when both exporter and importer countries are in crisis. However, this exacerbating effect becomes statistically insignificant two years after the crisis. As before, controlling for this interaction does not alter our main results on the detrimental impact of crises on product dynamics in financially-vulnerable sectors.

Regarding the conditioning information, higher levels of real GDP per capita of both

exporter and importer raise the product entry rate and reduce its exit rate. An increase in the bilateral real exchange rate is associated with lower levels of product entry rate but its effect on the product exit rate is statistically insignificant.

3.3. Financial crises and destination dynamics

In this section our interest is on the impact of financial crises on the extensive margin of exports to a given destination. The destination entry and exit rates are alternatively used as the indicators of destination dynamics. One advantage of considering destination dynamics is that independently from firm and product dynamics, the disruption effect could matter for the decision to exit a destination or to export to a new destination, as suggested by Muuls (2008). Since the interest is in the number destinations, we estimate a modified version of Equation 1 in the full panel of the measures of destination dynamics for the 34 countries used in subsections 3.1 and 3.2 over the 1997-2011 period.

$$Export_{cpkt} = FinVul_k \sum_{j=0}^{J} (\beta_1 Crisis_{c(t-j)} + \beta_2 Crisis_{p(t-j)} + \beta_3 Crisis_{cp(t-j)}) + \alpha X_{cpt} + d_{ct} + d_{ck} + \epsilon_{cpkt} \quad (2)$$

$Crisis_{p(t-j)}$ is now defined as a dummy variable taking 1 when at least one of the top 5 trading partners are in crisis.[11] Similarly, the regressors included in X are measured relative to the top 5 trading partners.

The regression results in Table 5 show that financially-dependent industries in crisis-hit countries experience lower levels of participation to new export destinations. The estimated coefficients on the crisis dummies are all negative in the destination entry rate equation, reflecting the detrimental nature of financial crises for the entry of exporting firms in new markets (columns 1 and 2). A contemporaneous crisis leads to a relatively lower destination entry rate, by 4.9 percent in vulnerable industries, confirming that financial crises are associated with increased sunk costs of exporting. This negative impact is persistently significant four years after the crisis. Additionally, during financial crises, the destination exit is disproportionately raised by 0.5 percent in financially-vulnerable industries but this effect becomes statistically insignificant in the years following the event.

11. Information on the top trading partners is taken from the IMF DOT Statistics available at : http://elibrary-data.imf.org/DataExplorer.aspx.

Given that we are no longer on a bilateral specification we control for relative GDP per capita. This is the deviation of the country's real GDP per capita from the average level of its trading-partner. The coefficients of 0.149 on this variable implies that, other things being equal, a country whose GDP per capita is twice the average GDP of its trading-partners will have a destination entry rate that is 29.8 percentage points higher than that of the trading-partners, on average (Column 1). Consistently with this result, the coefficient on the relative GDP PC in column 3 indicates that an increase in relative GDP reduces the destination exit rate of incumbents. Furthermore, a real appreciation is associated with lower destination entry rate and higher destination exit rate but the latter effect is not statistically significant.

Table 5 – Crises and destination dynamics

	(1)	(2)	(3)	(4)
Dependent variable	Destination entry rate		Destination exit rate	
Crisis	-0.044***	-0.049***	0.005**	0.004**
	(0.012)	(0.014)	(0.002)	(0.001)
Crises (t-1)	-0.102***	-0.094*	0.014	0.014
	(0.036)	(0.026)	(0.094)	(0.083)
		(0.271)		(0.008)
Crises (t-2)	-0.015	-0.014	0.028	0.034
	(0.063)	(0.061)	(0.077)	(0.061)
Crisis (t-3)	-0.080***	-0.083***	0.009	0.011
	(0.023)	(0.025)	(0.037)	(0.022)
Crises (t-4)	-0.041**	-0.044**	0.085***	0.079***
	(0.018)	(0.019)	(0.028)	(0.020)
Relative GDP PC	0.149*	0.136*	-0.018**	-0.012*
	(0.087)	(0.079)	(0.007)	(0.006)
Log REER	-0.133**	-0.133**	0.099*	0.087
	(0.060)	(0.061)	(0.056)	(0.089)
Average supply shock	-0.078**	-0.102*	0.093***	0.016
	(0.033)	(0.059)	(0.027)	(0.033)
Average demand shock	-0.113**	-0.044	0.068***	0.028
	(0.049)	(0.107)	(0.021)	(0.035)
Observations	17126	17126	17004	17004
R-squared	0.783	0.792	0.749	0.765

Note : The dependent variable is the entry or exit rate of products in exports by country and product category (HS-3 digit). REER stands for Real Effective Exchange Rate. The regressions include year and exporter-importer fixed effects. Heteroskedasticity-robust standard errors are reported in parentheses. ***, **, and * denote significance at the 1-percent, 5-percent, and 10-percent levels, respectively. Here the crisis interaction is defined to take 1 if the country is simultaneously in crisis with at least one of the its five top trading-partners. The relative GDP PC is the deviation of the country's real GDP per capita from its trading-partner average. All the crisis-related dummies are interacted with the sector-level financial dependence index.

We further investigate the variation of the magnitude of the crisis effect across coun-

tries by splitting our sample between countries with higher and lower financial account openness. The first group includes countries at the top 50% of the distribution of financial openness, averaged over the 1997-2008 period, [12] whereas the second group includes the bottom 50% of the distribution. Financial openness is measured by the Chinn & Ito (2008) index of capital account openness. [13] The results show that exporters are relatively more resilient to both supply-side and demand-side shocks in countries with higher financial openness (Tables 6 and 7 in the appendix). [14] Also, the supply-side effect is always insignificant for the sample of countries with higher financial account openness (Tables 6).

By contrast, this effect is large and statistically significant for the sample of lower financial openness, though insignificant on the destination exit rate (Tables 6). As regard the demand-side effect, it is significant in the case of more financially-open countries only for the entry rates. It has no significant effect on the exit rates in these countries. On average, this negative impact of crises in partner countries on the firm entry rate, for which both coefficients are significant and therefor comparable, is more than five times higher in countries with lower financial openness. Similarly, the interacting effect is always lower and statistically insignificant in countries with higher financial openness.

These regression results contribute to reconcile the two existing views in the literature. The debate on the relative importance of supply-side shocks versus demand-side shocks is now better understood through this decomposition of the impact of crises on the three dimensions of export dynamics. The results on the product and destination dynamics reveal the importance of both supply-side and demand-side shocks for export diversification.

4. Conclusions

Export diversification, as a core element of countries structural transformation, is now a priority on the policymakers' agenda. This study mainly revealed that financial vulnerability is negatively related to export diversification. Financial crises reduce export firm, product, and destination entry rates and increase the corresponding exit rates disproportionately more in financially-vulnerable industries. This detrimental effect is less pronounced in countries with initially more open capital account.

These empirical results have important policy implications in developing countries in

12. 2008 is the last year for which the data on financial openness are available.
13. See the list of countries in the appendix.
14. We report only the coefficients on our variables of interest to save space.

promoting export diversification. Reducing the dependence of firms to external financing may be a key for strengthening export dynamics and diversification, since this would result in increase entry rates into exporting and a reduced exit rates. Alternatively, measures to facilitate portfolio flows may be a second best option, given that increased capital inflows is found to be a good substitutes for domestic funding.

Références

Beck, T. (2002). Financial Development and International Trade : Is there a Link ? *Journal of International Economics*, 57(1):107–131.

Beck, T. (2003). Financial Dependence and International Trade. *Review of International Economics*, 11(2):296–316.

Becker, B. & Greenberg, D. (2007). Financial Development, Fixed Costs and International Trade. Working paper, Harvard Business School.

Berman, N. & Héricourt, J. (2010). Financial Factors and the Margins of Trade : Evidence from Cross-country Firm-level Data. *Journal of Development Economics*, 93(2):206–217.

Bernard, A. B. & Wagner, J. (2001). Export, Entry, and Exit by German Firms. *Review of World Economics*, 137(1):105–123.

Braun, M. (2003). Financial Contractibility and Asset Hardness. University of California-Los Angeles, Mimeo.

Cebeci, T., Fernandes, A., Freund, C. & Pierola, M. (2012). Exporter Dynamics Database. Working Paper 6229, World Bank Policy Research.

Chinn, M. & Ito, H. (2008). A New Measure of Financial Openness. *Journal of Comparative Policy Analysis*, 10(3):309–322.

Chor, D. & Manova, K. (2012). Off the Cliff and Back ? Credit Conditions and International Trade during the Global Financial Crisis. *Journal of International Economics*, 87(1):117–133.

Dell' Ariccia, G., Detragiache, E. & Rajan, R. (2008). The Real Effect of Banking Crises. *Journal of Financial Intermediation*, 17(1):89–112.

Do, Q.-T. & Levchenko, A. (2007). The Direction of Causality between Financial Developent and Economic Growth. *Journal of Financial Economics*, 86(3):796–834.

Laeven, L. & Valencia, F. (2013). Systemic Banking Crises Database. *IMF Economic Review*, 61(2):225–270.

Manova, K. (2006). Credit Constraints, Heterogeneous Firms, and International Trade. Harvard University, Mimeo.

Manova, K. (2008). Credit Constraints, Equity Market Liberalizations and International Trade. *Journal of International Economics*, 76(1):33–47.

Melitz, M. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica*, 71(6):1695–1725.

Minetti, R. & Zhu, C. (2011). Credit constraints and firm export : Microeconomic evidence from Italy. *Journal of International Economics*, 83(2):109–125.

Muuls, M. (2008). Exporters and credit constraints. A firm-level approach. Working Paper 200809-22, National Bank of Belgium.

Rajan, R. & Zingales, L. (1998). Financial dependence and growth. *American Economic Review*, 88(3):559–586.

Roberts, M. & Tybout, J. (1997). The Decision to Export in Colombia : An Empirical Model of Entry with Sunk Costs. *American Economic Review*, 87(4):545–564.

Svaleryd, H. & Vlachos, J. (2005). Financial Markets, the Pattern of Industrial Specialization and Comparative Advantage : Evidence from OECD Countries. *European Economic Review*, 49(1):113–144.

A. Appendix

Top 50% of the distribution of financial openness : Albania, Botswana, Burkina Faso, Cameroon, Costa Rica, Ecuador, Guatemala, Iran, Jordan, Lebanon, Macedonia, Mali, Mexico, Nicaragua, Niger, Peru, Senegal, Yemen

Bottom 50% of the distribution of financial openness : Bangladesh, Bulgaria, Cambodia, Chile, Colombia, Dominican Republic, El Salvador, Kenya, Lao PDR, Malawi, Mauritius, Morocco, Pakistan, South Africa, Tanzania, Uganda.

TABLE 6 – Crises and product dynamics : countries at the top 50% of capital account openness

Dependent variable	Firm entry rate of incumbents		Firm exit rate of incumbents	
Crisis in exporter	-0.005	-0.011	0.066	0.110
	(0.006)	(0.083)	(0.105)	(0.174)
Crisis in importer	-0.024*	-0.011**	0.029	0.106
	(0.013)	(0.004)	(0.083)	(0.209)
Crisis interaction		-0.112		0.038
		(0.145)		(0.073)
Dependent variable	Product entry rate of incumbents		Product exit rate of incumbents	
Crisis in exporter	-0.003	-0.011	0.098	0.205
	(0.014)	(0.083)	(0.193)	(0.219)
Crisis in importer	-0.026	-0.012*	0.037	0.049
	(0.105)	(0.006)	(0.082)	(0.128)
Crisis interaction		-0.034		0.011
		(0.119)		(0.018)
Dependent variable	Destination entry rate of incumbents		Destination exit rate of incumbents	
Crisis in exporter	-0.012	-0.011	0.184	0.182
	(0.101)	(0.109)	(0.205)	(0.206)
Crisis in importer	-0.073	-0.102*	0.028	0.029
	(0.088)	(0.058)	(0.054)	(0.061)
Crisis interaction		-0.038		0.077
		(0.116)		(0.131)

Note : The dependent variable is the rate of export entry or exit of products by country-destination. The regressions include year and exporter-importer fixed effects. Heteroskedasticity-robust standard errors are reported in parentheses. ***, **, and * denote significance at the 1-percent, 5-percent, and 10-percent levels, respectively. All the crisis-related dummies are interacted with the sector-level financial dependence index. The other regressors used previously are also included but not reported.

TABLE 7 – Crises and product dynamics : countries at the top 50% of capital account openness

Dependent variable	Firm entry rate of incumbents		Firm exit rate of incumbents	
Crisis in exporter	-0.104**	-0.139***	0.018*	0.026
	(0.045)	(0.042)	(0.010)	(0.102)
Crisis in importer	-0.127**	-0.073	0.172	0.178
	(0.011)	(0.80)	(0.199)	(0.204)
Crisis interaction		-0.295*		0.306
		(0.170)		(0.327)
Dependent variable	Product entry rate of incumbents		Product exit rate of incumbents	
Crisis in exporter	-0.029**	-0.034**	0.217*	0.177
	(0.012)	(0.014)	(0.127)	(0.200)
Crisis in importer	-0.100***	-0.109**	0.096	0.134*
	(0.030)	(0.047)	(0.107)	(0.078)
Crisis interaction		-0.168*		0.206
		(0.097)		(0.204)
Dependent variable	Destination entry rate of incumbents		Destination exit rate of incumbents	
Crisis in exporter	-0.080*	-0.080	0.118	0.110
	(0.046)	(0.040)	(0.135)	(0.201)
Crisis in importer	-0.116**	-0.098*	0.093**	0.088
	(0.050)	(0.056)	(0.040)	(0.107)
Crisis interaction		-1.127**		0.864*
		(0.341)		(0.499)

Note : The dependent variable is the rate of export entry or exit of products by country-destination. The regressions include year and exporter-importer fixed effects. Heteroskedasticity-robust standard errors are reported in parentheses. ***, **, and * denote significance at the 1-percent, 5-percent, and 10-percent levels, respectively. All the crisis-related dummies are interacted with the sector-level financial dependence index. The other regressors used previously are also included but not reported.